THE CLAIMS

The text of all pending claims, including withdrawn claims, is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

1. (ORIGINAL) A de-interlacing method of converting an interlaced format into a progressive format comprising:

performing low pass filtering on respective predetermined pixels of a current frame and a previous frame;

comparing a threshold value to a difference value between the respective filtered pixels in a current field to be subjected to de-interlacing in one of the current and previous frames and corresponding respective filtered pixels in preceding and succeeding fields to the current field and in the current and previous frames;

determining motion index values of the respective pixels in the current and previous frames based upon the comparing;

determining a motion mode of a pixel subject to the de-interlacing in the current field based upon the determined motion index values of temporally and spatially adjacent pixels to the current field pixel, in the preceding and succeeding fields to the current field and in the current and previous frames; and

selectively performing spatial interpolation and temporal interpolation on the current field pixel according to the determined pixel motion mode.

2. (ORIGINAL) The de-interlacing method of claim 1, wherein the low pass filtering is performed by weighted averaging in which an average is obtained by multiplying a predetermined filter coefficient and values of the pixels within a window having a predetermined vertical and horizontal size centering on a respective pixel subject to the filtering.

3. (ORIGINAL) The de-interlacing method of claim 1, wherein the current field subject to de-interlacing is an n-th field and a current pixel at a position (i, j) within the n-th field is F_n (i, j), and

the method further comprises:

determining the motion index value M_n(i, j) of the current pixel F_n (i, j) as 1, if the

difference value is equal to or greater than the threshold value, and

determining the motion index value $M_n(i, j)$ of the current pixel $F_n(i, j)$ as 0 if the difference value is less than the threshold value.

4. (ORIGINAL) The de-interlacing method of claim 1,

wherein the current field subject to de-interlacing is an n-th field and a current pixel at a position (i, j) within the n-th field is $F_n(i, j)$, and $M_n(i, j)$ is the determined motion index value of $F_n(i, j)$, and

wherein the motion mode value of the current pixel $F_n(i, j)$ is determined by

$$M = \sum_{k=-1}^{1} \{M_n(i, j+k) + M_{n+1}(i-1, j+k) + M_{n-1}(i-1, j+k) + M_{n-1}(i+1, j+k) + M_{n-2}(i, j+k)\}$$

5. (ORIGINAL) The de-interlacing method of claim 1,

wherein the current field subject to de-interlacing is an n-th field and a current pixel at a position (i, j) within the n-th field is $F_n(i, j)$, and

wherein if a sum of the motion index value of the current pixel $F_n(i, j)$ and the motion index values of temporally and spatially adjacent pixels of the current pixel $F_n(i, j)$ is "0", the motion mode of the $F_n(i, j)$ is a stop mode, and if the sum is not "0", the motion mode of the $F_n(i, j)$ is a motion mode.

6. (ORIGINAL) The de-interlacing method of claim 1,

wherein the current field subject to de-interlacing is an n-th field and a current pixel at a position (i, j) within the n-th field is $F_n(i, j)$, and

wherein the temporal interpolation is applied to the current pixel $F_n(i, j)$, if determined that the motion mode of the current pixel $F_n(i, j)$ is a stop mode and the spatial interpolation is applied to the current pixel $F_n(i, j)$, if determined that the motion mode of the current pixel $F_n(i, j)$ is a motion mode.

7. (ORIGINAL) The de-interlacing method of claim 1,

wherein the current field subject to de-interlacing is an n-th field and a current pixel at a position (i, j) within the n-th field is $F_n(i, j)$, and

the method further comprises:

replacing the motion mode of a color difference component of the current pixel F_n

(i, j) with the motion mode of a luminance component of the current pixel F_n (i, j); and

obtaining an output value of the color difference component of the current pixel F_n (i, j) by interpolating two adjacent pixels on a temporal axis, if determined that the motion mode value of the luminance component is a stop mode, and obtaining an output value of the color difference component of the current pixel F_n (i, j) by spatially interpolating in a 90° direction the color difference component of the current pixel F_n (i, j), if determined that the motion mode value of the luminance component is a motion mode.

8. (ORIGINAL) A de-interlacing apparatus converting an interlaced image format into a progressive image format, the de-interlacing apparatus comprising:

a spatial interpolation unit which spatially interpolates a pixel in a current frame along detected edge directions of the pixel at respective pixels in the current frame;

a temporal interpolation unit which interpolates a pixel in the current frame by averaging the pixel of the current frame and a corresponding pixel of a previous frame;

a motion index value determination unit which performs two-dimensional low pass filtering on respective predetermined pixels of the current frame and the previous frame, obtains a difference value between the respective filtered pixels in a current field subject to de-interlacing in one of the current and previous frames and corresponding respective filtered pixels in preceding and succeeding fields to the current field and in the current and previous frames, and compares the difference value with a threshold value to determine motion index values of the respective pixels in the current and previous frames; and

a motion mode determination unit which determines a motion mode of a pixel subject to the de-interlacing in the current field based upon the determined pixel motion index values of temporally and spatially adjacent pixels to the current pixel, in the preceding and succeeding fields to the current field and in the current and previous frames, and selects the spatial interpolation unit and temporal interpolation unit to interpolate the current field pixel according to the determined pixel motion mode.

9. (ORIGINAL) The de-interlacing apparatus of claim 8, wherein the motion index value determination unit comprises:

a first low pass filter which performs the two-dimensional low pass filtering on the respective pixels in the current frame;

a second low pass filter which performs the two-dimensional low pass filtering on the respective pixels in the previous frame;

a difference calculation unit which obtains the difference value according to a difference between a pixel value output from the first low pass filter and a pixel value output from the second low pass filter; and

a difference value comparator which compares the difference value calculated by the difference calculation unit with the threshold value, and determines the motion index value of a pixel in the current field.

10. (ORIGINAL) The de-interlacing apparatus of claim 9, wherein the difference value comparator determines the motion index value of the current field pixel as 1, if the difference value is equal to or greater than the threshold value, and determines the motion index value of the current field pixel as 0, if the difference value is smaller than the threshold value.

11. (ORIGINAL) The de-interlacing apparatus of claim 8, wherein the motion mode determination unit further:

replaces the motion mode of a color difference component of the current pixel F_n (i, j) with the motion mode of a luminance component of the current pixel F_n (i, j); and

obtains an output value of the color difference component of the current pixel F_n (i, j) by interpolating two adjacent pixels on a temporal axis, if determined that the motion mode value of the luminance component is a stop mode, and obtaining an output value of the color difference component of the current pixel F_n (i, j) by spatially interpolating in a 90° direction the color difference component of the current pixel F_n (i, j), if determined that the motion mode value of the luminance component is a motion mode.

12. (ORIGINAL) A de-interlacing image processor converting an interlaced image format into a progressive image format, comprising:

at least one programmed computer processor de-interlacing the interlaced image format according to a process of:

interpolating a pixel of a current frame along detected edge directions of the pixel at respective current frame pixels;

interpolating a pixel of the current frame by averaging the pixel of the current frame and a pixel of a previous frame;

two-dimensional low pass filtering a pixel of the current frame and a pixel of a previous frame;

obtaining a difference value between the filtered pixel of the current frame and the

filtered pixel of the previous frame;

comparing the difference value with a threshold value to determine a motion index value of the pixel in the current frame;

determining a motion mode of a pixel in a current field of the current frame based upon motion index values of pixels of the current field and adjacent peripheral pixels to the pixel, in the current and previous fields to the current field and in the current and previous frames; and

selecting the spatial interpolation and the temporal interpolation for the current field pixel according to the motion mode of the current field pixel.

13. (ORIGINAL) A de-interlacing image processor converting an interlaced image format into a progressive image format, comprising:

a programmed computer processor determining a motion mode of a pixel in a current interlaced image frame field by performing Interlaced-to-Progressive Conversion using motion index values determined from two-dimensional low pass filtered pixel values of a previous interlaced image frame and the current interlaced image frame.

14. (ORIGINAL) The de-interlacing image processor of claim 13, wherein the programmed computer processor uses a sequence of fields in two adjacent interlaced image frames as preceding and succeeding fields to the current field in the previous and current image frames, and the motion mode of the pixel is determined based upon the motion index values of temporally and spatially adjacent pixels to the pixel, in the preceding and the succeeding fields to the current field and in the previous and current image frames.

15. (ORIGINAL) The de-interlacing method of claim 1, wherein the low pass filtering on a pixel is performed according to:

$$cm1 = \sum_{l=-1,0,1} \omega_{0,l} F_{n+1}(j, j+1) + \sum_{k=-1,1} \sum_{l=-1,0,1} \omega_{k,l} F_{n+2}(i+k, j+l).$$

16. (ORIGINAL) The de-interlacing method of claim 1, wherein the low pass filtering on a pixel is performed according to:

$$cm2 = \sum_{l=-1,0,1} \omega_{0,l} F_{n-1}(j, j+1) + \sum_{k=-1,1} \sum_{l=-1,0,1} \omega_{k,l} F_{n}(i+k, j+l).$$